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Farnell

TOPS Triple Output Power Supply

INSTRUCTION BOOK

INSTRUCTION BOOK FOR

TOPS Triple Output Power Supply

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Issue 3 8-78

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SCHEDULE OF EQUIPMENT

The equipment has been carefully packed to prevent damage in transit. When removing the unit from the box be sure that all parts and accessories are removed from the packing material.

The complete equipment comprises:-

a) 1 off Triple output power supply type T.O.P.S.

b) 1 off Instruction book

Note: In the event of damage in transit or shortage in delivery, separate notices in writing should be given to both the carriers and Farnell Instruments Ltd. within three days of the receipt of goods, followed by a complete claim within five days. All goods which are the subject of any claim for damage in transit or shortage in delivery should be preserved intact as delivered, for a period of seven days after making the claim pending inspection or instructions from Farnell Instruments Ltd. or an agent of this company.

INTRODUCTION

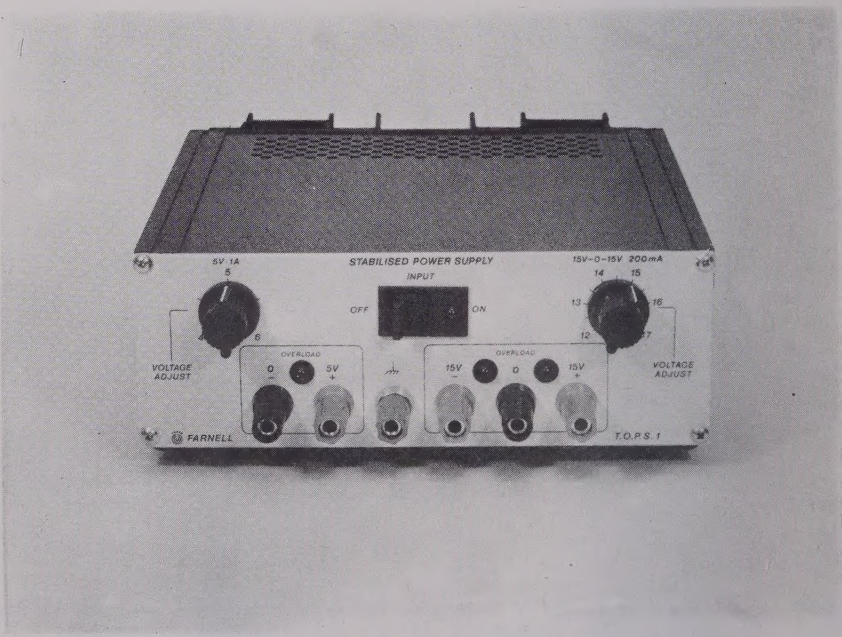
The Farnell T.O.P.S. triple output bench power supply provides outputs of either 5 volts at 1 amp and 15-0-15 volts at 200mA (T.O.P.S.1) or 5 volts at 5 amps and 15-0-15 volts at 1 amp (T.O.P.S.2). It is suited for use as a power source for mixed linear and digital I.C. systems at the 'breadboard' stage and for general use.

The unit provides, by means of approximately calibrated front panel potentiometers, adjustment in the range 4-6V on the nominal 5 volt output and 12-17V on each rail of the nominal 15-0-15V output. The twin outputs are 'tracking' i.e. the single front panel potentiometer adjusts both.

Overcurrent protection is provided on all rails and indication of overload condition is provided by front panel mounted L.E.D. devices.

Overvoltage protection is provided on the 5 volts output.

The unit will operate over the ambient temperature range of 0 to 40°C.



SPECIFICATION

MAINS INPUT	A.C. 220, 240V 50-400Hz 110, 120V versions available
MAINS VARIATION TOLERATED	±10%
OUTPUT	T.O.P.S.1 4 - 6V d.c. 1A and 12 - 17V d.c. 200mA T.O.P.S.2 4 - 6V d.c. 5A and 12 - 17V d.c. 1A
LINE REGULATION (Output change for a ±10% mains change)	Less than 0.05% + 2mV
LOAD REGULATION (Output change for zero to full load change)	Less than 0.1%+5mV (TOPS1), 0.2%+5mV (TOPS2) on 5V output Less than 0.05% + 2mV on 15-0-15V output
RIPPLE AND NOISE (at full load (ΔF = 80kHz)	Less than 2mV pk-pk on 5V output. Less than 2mV pk-pk on 15V output
TRANSIENT RECOVERY TIME typical	Less than 300µSec for output to recover within 50mV following a 10% to 100% load change of 1µSec risetime.
TEMPERATURE COEFFICIENT typical	0.02% per ^{o}C
MAXIMUM AMBIENT TEMPERATURE	$40^{o}C$
STORAGE TEMPERATURE	$-40^{o}C$ to $+85^{o}C$
OVERLOAD PROTECTION	Foldback current limiting on all outputs
OVERLOAD INDICATION	Onset of current limiting indicated by front panel L.E.D. on all outputs
OVERVOLTAGE PROTECTION	Thyristor 'crowbar' protection circuit 5V output only

DIMENSIONS approx. overall

	T.O.P.S.1	T.O.P.S.2
Height	70mm (2.8")	103mm (4.1")
Width	180mm (7.0")	250mm (9.8")
Depth	210mm (8.3")	272mm (10.9")
Weight	1.5kg (3.5lbs)	5.6kg (12.3lbs)

OPERATING INSTRUCTIONS

The units are normally supplied set for use with nominal 240V a.c. mains supplies, but may be specified to be set for 220V, 110V or 120V supplies.

Check that the unit supplied is suitable for the local mains supply. Unless there is a label on the rear of the unit to the contrary, the mains input is set to 240V.

The unit will operate in ambient temperatures of 0 to 40°C.

Because cooling is by natural air convection the air flow around and underneath the rear heat sink assembly should not be obstructed. Please note: at full load output the rear heat sink attains a temperature of approximately 80°C in an ambient of 20°C. The sides of the unit are thermally isolated from the heat sink proper.

Mains connections

Mains input is via a flying mains lead the colour coding of which is:-

Brown	-	mains live input
Blue	-	mains neutral input
Green/yellow	-	mains earth input.

Output connections

These are located on the front panel. The output terminals of the 5 volt supply are to the left of the earth terminal and labelled '0' and '5V'
- +

The output terminals of the 15-0-15V supply are to the right of the earth terminal and labelled '15V', '0' and '15V'
- +

Overload indicators

The overload indicators are located on the front panel adjacent to their appropriate output terminal.

Input ON/OFF switch

This is located in the centre of the front panel and contains a built in input 'ON' indicator L.E.D. This should be illuminated when the switch is in the 'ON' position.

Voltage adjustment control

The 5 volt output voltage control is located at the top left of the front panel and is approximately scaled 4 to 6 volts.

The 15-0-15V output voltage control is located at the top right of the front panel and is approximately scaled 12 to 17 volts. This control adjusts both of the nominal 15 volt outputs.

CIRCUIT PRINCIPLES

The unit consists of one 5 volt rail along with a tracking 15-0-15 volt supply. The 5 volt control circuit consists of a 'ring of two' reference circuit which provides a stable reference voltage at Z7. This is compared to a fraction of the output voltage at VT13 and VT14 bases. Any difference in potential at these bases is amplified and fed to the output series regulator transistors VT17 and 18 in such a sense as to oppose the original difference voltage. VT8 provides current limiting, the level of which is set by P6. Overload indication is provided by VT16 and LED4. When the output is overloaded, VT8 conducts and the output voltage becomes lower than the set voltage. At this point the comparator VT13, VT14 and VT12 is demanding full output i.e. VT12 is bottomed.

The drive current is absorbed by VT8 and this excess current is used to feed LED4 via VT16 which is driven hard into conduction.

The 15-0-15V supply control comprises reference Z3, fed from the negative output which is compared to a fraction of the negative output voltage by IC2, an integrated circuit amplifier. Any difference signal is amplified by IC2 and applied to series regulator transistor VT5 in such a sense as to oppose the original difference. The negative supply voltage is used as reference for the positive supply control system. R2 and R3 sense the positive output and the potential divider R5, P1 and R6 the overall voltage (i.e. negative to positive outputs). The positive supply output voltage is determined by the relative values of these resistors and the value of negative supply output voltage. P1 is used to adjust the positive output voltage equal to the negative output voltage. VT3 and VT2 are used to provide current limiting and VT6 and LED3 and VT1 and LED2 provide overload indication for their respective outputs on the same principle as the 5 volt output. Z4 and D10 provide the necessary starting circuitry for the 15-0-15V output, R31 performs a similar function for the 5V output.

Guarantee

The equipment supplied by Farnell Instruments Ltd. is guaranteed against defective material and faulty manufacture for a period of twelve months from the date of despatch. In the case of material or components employed in the equipment but not manufactured by us, we allow the customer the period of any guarantee extended to us.

The equipment has been carefully inspected and submitted to comprehensive tests at the factory prior to despatch. If, within the guarantee period, any defect is discovered in the equipment in respect of material or workmanship and reasonably within our control, we undertake to make good the defect at our own expense subject to our standard conditions of sale. In exceptional circumstances and at the discretion of the Service Manager, a charge for labour and carriage costs incurred may be made.

Our responsibility is in all cases limited to the cost of making good the defect in the equipment itself. The guarantee does not extend to third parties, nor does it apply to defects caused by abnormal conditions of working, accident, misuse, neglect or wear and tear.

Maintenance

In the event of difficulty or apparent circuit malfunction, it is advisable to telephone (or telex) the Service Department or your local Sales Engineer or Agent (if overseas) for advice before attempting repairs.

For repairs and recalibration it is recommended that the complete instrument be returned to:-

The Service Department,
Farnell Instruments Ltd.,
Sandbeck Way,
Wetherby, West Yorkshire
LS22 4DH.

Tel: 0937 3541 Telex; 557294

or

Service Depot,
Farnell Instruments Ltd.,
2 Orley Court,
Greenford Road,
Harrow, Middlesex HA1 3QD.

Tel: 01-864 7433 & 7434

Please ensure adequate care is taken with packing and arrange insurance cover against transit damage or loss.

For those who operate their own comprehensive service departments and wish to repair and maintain the equipment themselves, the following section may assist.

Access for repair

TOPS1

Access to the main control circuit board is gained by removing the two top screws in the rear panel. Slacken the remaining two front panel and two rear panel screws and ease the side panels apart from the top of the unit. It should then be possible to remove the top panel to gain access to the upper part of the main control circuit board and front panel potentiometers. The lower panel may be removed by removing two screws in one side panel. The two heat sinks are removed by removing the screws in the outer U-sections of each heat sink - these are located in captive threaded bushes on the rear panel.

TOPS2

The main control circuit board is accessed by removing the front panel screws and then pulling the panel forward at the same time as hinging it downwards. The top panel can then be removed, as can the bottom panel if the front panel is hinged upwards instead of down.

Setting up procedure

In the event of major repairs to the unit it may be necessary to reset some or all of the internal adjustment potentiometers. Figure 1 shows the location of the trimming potentiometers viewed from the top of the unit.

The procedure is as follows:-

1) 5 volts output

On no load, measure the output voltage with the front panel potentiometer set fully anti-clockwise (this should correspond to the 4V scale mark on the front panel). Adjust P4 to give 4V output. Set the front panel potentiometer fully clockwise (corresponding to the 6V scale mark). Adjust P5 to give 6V output.

Apply an external load and set P6 fully clockwise. Adjust the load to 1.1 Amp (5.5A TOPS 2) and adjust P6 until the overload LED just begins to glow.

2) 15 volts output

On no load, measure the voltage between the 0 and -15V terminals. Set the front panel potentiometer fully anti-clockwise (corresponding to the 12V scale mark). Adjust P3 to give 12V output. Set the front panel potentiometer to fully clockwise (corresponding to the 17V scale mark). Adjust P2 to give 17V output.

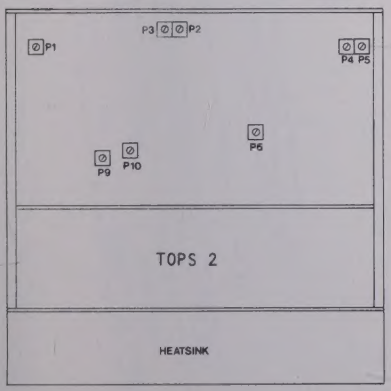
With the front panel potentiometer at the 17V setting, measure the voltage between the 0 and +15V terminals. Adjust P1 to give 17V output.

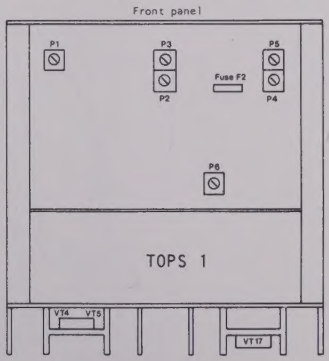
TOPS2

Apply an external load to the +15V supply and set P9 fully clockwise. Set the load current to 1.1 amps and adjust P9 until the output overload LED just begins to glow. Repeat procedure for -15V output using P10 in place of P9.

P1 15V outputs set balance
P2 15V outputs set max. volts
P3 15V outputs set min. volts
P4 5V output set min. volts
P5 5V output set max. volts
P6 5V current limit set
P9 +15V current limit set) TOPS2
P10 -15V current limit set) only

Location of internal trimming potentiometers





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